"*Proposed Special Scientific Collections*

"Although we think it desirable that Scientific Museums and Collections should be maintained in the Universities to an extent which would render them available for original research, as well as for the purposes of education, we do not attach the same importance to this point as to the preceding, because museums and collections have been formed and will be formed in other places than in Universities, whereas laboratories adapted for the instruction of students in the methods of scientific investigation are not likely to be founded except in connection with educational institutions; and although it is a disadvantage to a scientific man not to have all the collections that he desires immediately at his hand, yet, considering the proximity of the Universities to London, it cannot be said that this disadvantage amounts to more than an inconvenience.

"We also are of opinion that it is very desirable that such more extensive collections as may be formed in the Universities should, as far as possible, be kept separate from the more limited collections intended for educational purposes. A Museum may be very easily made too large for these purposes, and instead of giving the student clearer ideas, may serve to confuse him.

"*Proposed Doctorate in Science*

"We have already referred to the possibility of instituting Higher Degrees, to be conferred upon students, not in accordance with the results of an examination, but upon their giving proof of capacity for original research. The evidence of Dr. Frankland and of Sir William Thomson, which we have already quoted, and to which we might add that of the late Prof. Rankine, appears to us conclusive upon the point that there is a real danger in the examination system; and in our opinion this danger might be guarded against by instituting a higher degree in Science, the obtaining of which should be regarded as a great honour, and which should not be awarded except with reference to original work. The plan of requiring from a candidate for the Doctorate in Science a dissertation embodying an account of some original research of his own is strongly approved by such competent witnesses as Dr. Siemens, Dr. Carpenter, and Prof. Frankland. This plan has been adopted in several of the German Universities, and has now become the established rule in France."

METEOROLOGICAL CONFERENCE AT LEIPSIG DURING AUGUST 1872*

OF the Congresses which have recently been held, none were more urgently called for than an International Congress of Meteorologists. Doubtless even under the diverse systems of observation which have been in use at national observatories and among meteorologists of different countries, large and valuable contributions have been made to Climatology and other departments of Meteorology. We need only refer to the various charts which have been published, showing the geographical distribution of atmospheric and oceanic temperature, of atmospheric pressure, of humidity, of prevailing winds, and of rainfall, and to the enormous amount of materials now being amassed, illustrative of the nature and course of storms, to show the important results which have been obtained. It must, however, be confessed that, as respects nearly the whole of this information, it can be regarded as valuable only in the sense of its being sufficiently approximate so as to meet the requirements of some of the more pressing practical questions of the science, and not because it is precise.

It is when we attempt inquiries into such questions as the diurnal and annual march of the different meteorological elements, and the relations of these elements *inter se*, and of weather on a large scale, that the general unsatisfactoriness of the systems by which observations are made in different countries comes to be forcibly felt, owing to their want of precision and uniformity. The want of uniformity is most conspicuous as respects temperature, humidity, and wind—or just those fundamental facts which must be scientifically observed and discussed before we can hope to solve the problem of weather changes.

In order to bring about a greater uniformity of procedure in different countries, it was proposed to hold a Meteorological Congress at Vienna in 1874. In June last, Bruhns of Leipsig, Wild of St. Petersburg, and Jelinek of Vienna, issued an invitation to meteorologists to attend a preliminary conference to be held at Leipsig in August, for the purpose of preparing the programme for the Vienna Congress, to instigate preparatory experiments on some of the more important questions, and thereby render it possible for the Congress to arrive at immediate conclusions on many points. The Conference was thus only consultative. Accompanying the invitation were a series of twenty-six questions, which it was proposed to submit to the consideration of the Conference.

Upwards of fifty persons attended the meetings of the Conference, which lasted three days. The opinions of the different speakers on the points raised by the 26 questions are detailed in the pamphlet before us, which contains also the written opinions of 14 meteorologists who were unable to be present, including the well-known names of Dove, Rubenson, Mohn, Mühry, and Wolf, as well as the results of the deliberations of the French meteorologists at Bordeaux in September. The subjects treated of may be conveniently classed under the heads of instruments, their position, the methods of discussing, publishing, and utilising the observations.

Barometers.—To those who have attempted to discuss weather, it is well known that nothing exact or satisfactory need be looked for in the result, unless observations from numerous barometers well distributed be available. It is thus desirable that barometers be procurable at a moderate price for stations of the second order. Are Board of Trade barometers—barometers fitted with a float—or aneroids, suited for such stations; or is there any other cheap form of barometer that would serve the purpose? After a lengthened discussion it was referred to Dr. Hann of Vienna to prepare a report for the Vienna Congress. The most diverse opinions were expressed regarding the aneroid, arising probably from the experience of the different writers and speakers—some aneroids going well for years with no permanent alterations occurring in their indications; some going well so long as a small range of pressure is recorded, but undergoing alterations after every great barometrical depression; some constantly altering in one direction, others in either direction, &c. Since, however, it can be safely affirmed of no aneroid, how good soever it may have proved itself to have been, that it will continue to indicate correctly for even a brief time to come, the Conference came to the sound conclusion that the aneroid should not be used instead of the mercurial barometer, but only as an interpolation instrument, to fill up blank when the mercurial barometer is out of order, or when it cannot be observed on board ships in rough weather.

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* Report of the Proceedings of the Meteorological Conference at Leipsig. Protocols and Appendices. Translated from the Official Report, Appendix to Vol. vii. of the "Zeitschrift für Meteorologie." Published by the authority of the Meteorological Committee. London, 1873.

Maximum and Minimum Thermometers.—Rutherford's minimum spirit thermometer was regarded as satisfactory. On it being pointed out by several members that this thermometer is liable to go out of order by the spirit evaporating and condensing in the upper end of the tube, Ebermeyer, of Aschaffenburg, stated that this objection could be removed if the tube were at its entrance into the bulb inserted nearly up to the inner side of the bulb. We commend this suggestion to opticians; for if Ebermeyer's experience be confirmed, a source of serious and not infrequent error will be removed. On the other hand the performance of no *maximum thermometer* was considered to be so satisfactory that a uniform construction could be generally recommended; and the opinion was expressed that it was very desirable that a trustworthy maximum thermometer was devised, not liable for instance to have the mercury disturbed during high winds like Negretti and Zambra's, or the index portion go out of order as Rutherford's or Phillip's.

Instruments for Radiation.—Mr. Symons, who has paid much attention to this question, has been requested to give a report to next Congress on the modes of observation adopted in England for radiation. But it must be confessed that the methods of observation in this important inquiry are still in a very primitive state. Mr. Salt well pointed out that at present the results obtained with different instruments were not comparable with each other, and one hardly knew with the instruments now in use what was really observed.

Hygrometers.—Since the dry and wet bulb hygrometer is not trustworthy at low temperatures and in cases of extreme dryness, and the hair hygrometer fails also at the dew points, and since there is no hygrometer yet devised, at least for regular observations at stations, which gives approximately exact results as to moisture in all cases, it was recommended to make further experiments and collect the experience of meteorologists on the subject. From the favourable opinions expressed by Wild and others of the action of the hair hygrometer, further experiments with this instrument are very desirable, so that it might be made available for more accurate observations on the hygrometry of the air at temperatures below the freezing-point than the dry-and-wet hygrometer admits of. Another desideratum is an extensive series of experiments with Regnault's hygrometer in conjunction with the dry-and-wet bulb hygrometer in dry hot climates such as N.W. India, for the purpose of ascertaining how far the readings of the dry-and-wet bulbs can be used as data from which the dew-point may become known; and determining the requisite data for the correction and completion of the present hygrometric tables, particularly at points below freezing, and at high temperatures combined with great dryness.

Wind.—Curiously enough, the question of proper instruments for measuring the velocity and force of the winds does not seem to have been under discussion, even though it is one of the most important and pressing questions of the science. Anemometers, both for velocity and pressure, are indispensable to properly equipped observatories. Now it cannot yet be said that the anemometers for velocity give quite correct indications that they are comparable, *inter se*, and that we have a practicable means of ascertaining their errors from time to time.

Equally remarkable was the omission in the discussions, to consider what are the required conditions which anemometrical stations ought to fulfil, so that the instrument shall indicate the true movement of the air over the region where it is placed; or, if this cannot be accomplished, what observations should be instituted in order to ascertain how far the direction of the wind is deflected by the physical configuration of the surface, and its force diminished (or in rare cases accelerated) as compared with the general movement of the air over the place.

Pressure anemometers at a moderate cost are a great desideratum. Little satisfactory is known of the relation of pressure to velocity.

Rain.—The Committee proposed that a report of all the experience regarding the position, size, height above ground, and time of reading the rain gauge which has been yet gained should be prepared for the Vienna Congress. For the preparation of such a report the great storehouse of facts at hand are those collected by Mr. Symons in the successive parts of his "British Rainfall" and "Meteorological Magazine," which the members of the Congress would do well to consult.

Evapometer.—The present state of the evapometer is one of the least satisfactory of all the meteorological instruments. Considering the importance of the drying property of the air in relation to meteorology generally, but especially as one of the most important constituents of climate, it is to be hoped that some method will be devised by which results, at least roughly comparable to begin with, may be obtained.

The difficult, but vital question of the position of the thermometer does not seem to have been faced by the conference. It is earnestly hoped that the Vienna Congress will not shirk this question, but will seriously discuss it and arrive at some decision, or suggest some steps to be taken, that will ultimately lead to the degree of uniformity which is so imperatively called for. Till this be secured, the expensive systems of horary or continuous registration of temperature carried on at the great observatories of this and other countries, cannot supply the data for the determination of temperature "constants," seeing that they are incomparable with each other, as well as with the observations made at those numerous stations of the secondary order to which we must look for the working out of the great national question of local climates in their bearing on the health, productions, and commerce of the country. The question would be of comparatively easy solution were it possible, in the interests of cosmical inquiries, to ignore the past. But it is essential in the case of the older observatories to adhere to the same system of observing hitherto in use; until at least four or five years' observations have been made simultaneously with a second set of instruments placed in uniformity with those of other observatories.

The question of the practicability and utility of Weather and Storm Signals in Europe was considered, and it was remitted to Messrs. Buys Ballot, Scott, and Neumeyer, to collect the opinions of meteorologists on this important question, and draw up a report for the Vienna Congress. As it is understood that the committee have collected a good deal of information, some valuable results may be expected.

In the "Sequel to the Suggestions," Dr. Buys Ballot has suggested for the consideration of the Congress, the establishment, by societies, of stations in regions which are at present a blank. The Smithsonian Institution, the Dutch Meteorological Institute, and, in our country, the Scottish Meteorological Society have, with the means at their disposal, done a good deal in this direction, with results which have aided much in the furtherance of the science. But to fill up the enormous blanks which still disgrace British America, South America, most of Africa, and the Pacific, some concerted action on the part of meteorologists is indispensable. In connection with this proposed development, reference may be made to the scheme in contemplation by the Chinese Government, in carrying out which Mr. Campbell has been sent to this country to request advice from scientific authorities as to the general organisation of the stations, and to procure the necessary instruments, registers, &c. Towards the carrying out of this plan, the Congress will doubtless give Mr. Campbell very hearty support.

THE TYPHOID EPIDEMIC IN LONDON

THE recent outbreak of enteric fever in the West End of London presents many points of remarkable interest and teaches many useful lessons. Typhoid, Enteric, or Pythogenic fever, although a disease about which all our accurate knowledge is quite recent, is a fever about the causes of which we really know a great deal, but which, for all that, seems to appear from time to time in the places where it might be least expected.

About the nature of the poison which produces it we know as yet but little; we know that its habitat is in the refuse matters excreted from human intestines; we know that it is, under certain circumstances, developed in such excretal matters during their decomposition, but it is yet a moot point whether it is from time to time produced *de novo* under suitable conditions, or whether it is always necessary that some of the poison, however small a quantity, be introduced from without to cause such decomposing matters to become infectious. We are accustomed to regard this as the least specific of the diseases of its kind, but each outbreak which is traced to its source gives a rude shock to such ideas. The "filth-born" fever *par excellence*, it ought not, one would think, to need to wait to be introduced to the country places where, year after year for centuries, the shallow wells from which drinking water is obtained are, in effect, the drains of the premises; or to the town houses, in which the only ventilator to the sewer is the waste pipe which opens directly over the surface of the water in the cistern; but yet such is the case so universally, that when we cannot find out how the poison has been introduced, we should acknowledge our inability to do so, and not cut the knot by saying that it has originated on the spot, a conclusion for which, in the present state of our knowledge, we have no real proof whatever. The number of instances in which epidemics have been traced to single imported cases is now so great that, although it does not actually prove that such is always the case, still it should make us hesitate before declaring that the disease has broken out without direct importation in any given place.

The facts relating to the epidemic which still engages general attention in England, are, in order of sequence, and independently of any theory at all, as follows:—

The disease was noticed to be prevalent, in the middle and latter part of July, in certain houses in the parish of Marylebone, and notably in houses inhabited by medical men, houses where every possible precaution was believed to have been taken: it was observed by Dr. Murchison that an undue proportion of the persons attacked obtained their milk from a particular dairy, and on further investigation the conviction grew upon him that this milk was, somehow or other, contaminated with typhoid poison, and was spreading the disease. A difficulty arose, inasmuch as the locality in which the fever cases were was only a small part of the district supplied with milk from the suspected dairy; but Mr. Radcliffe, on examining the mode of distribution of the milk, showed that on the hypothesis that the milk from one of the several farms was contaminated before coming to the dairy, a localised outbreak or several localised outbreaks of fever must have been the result; so that any suspicion which may have existed as to the cause being possibly to be found in the precincts of the dairy in London, vanished at once.

On the other hand it was found that the owner of one of the dairy-farms had died on June 8; that he had been out of sorts since early in May, and sufficiently so for his two medical men to consult with a third on the subject; that the medical men all suspected that he had enteric fever; that this suspicion became stronger when the patient passed a large quantity of blood and putrid matter on June 1, which blood, &c., was ordered to be buried away from the house, as being most probably infectious; that the patient became considerably better towards the end of the first week of June, but that he died suddenly on June 8 while getting out of bed, no medical man being present; and finally that the medical attendant not being sure of the diagnosis of enteric fever, and considering that, anyhow, the man had got over it, certified that he died from heart disease, as he had for years been suffering from the effects of a "fatty heart;" nevertheless he took the precaution to have the body buried as speedily as possible, thinking that it might be infectious.

Taking all the facts together, these two series of events present at any rate a most remarkable coincidence; and when we find that enteric fever is and has for some months been prevalent in the villages near the farm and in daily communication with it, and that a son of the farmer has since had the disease, the conclusion is irresistible that the farmer died of enteric fever, and that he